# 銘傳大學九十學年度轉學生招生考試

## 七月二十九日　第五節

## 資管　轉三

## 統計學　試題

***可攜帶計算機**

請詳列計算過程，否則不給分

一、說明或解釋下列各題:

(1) 中央極限定理(Central Limit Theorem)(5 分)

(2) 隨機樣本(Random Sample)(5 分)

(3) 柴比契夫定理(Chebyshev's Theorem)(5 分)

(4) 最小變異數無偏估計量(Minimum Variance Unbiased Estimator)(5 分)

二、假設陳老師只教甲、乙兩班統計學，某次考試各班平均成績，標準差及出席人數分別

| 班別 | 平均成績 | 標準差 | 人數 |
|---|---|---|---|
| 甲 | 60 | 12 | 50 |
| 乙 | 78 | 13 | 40 |

(1) 若兩班合併計算，則陳老師這兩班學生的平均成績為何？(5 分)

(2) 若兩班合併計算，則陳老師這兩班學生成績的標準差為何？(5 分)

三、設 A、B 為兩件事，且 P(A)=0.4, P(B)=0.3, P(A∩B)=0.1

(1) 試求 P(A∪B).(5 分)

(2) 試問 A,B 兩事件是否互相獨立?為什麼?(5 分)

四、設隨機變數 X 的機率分配為二項分配 b(10,0.3).

(1) 試問 X 的期望值為多少?(5 分)

(2) 試寫出 X 的機率函數?(5 分)

五、自一批產品中隨機抽出 100 個產品加以檢查，發現其中有 10 個為不良品。試求該批產品不良率之 95%的信賴區間。(10 分)

六、為了解台北市每部自用轎車一年平均行駛里程數 $\mu$ 是否超過 10,000 公里，特舉行一次抽樣調查，隨機抽出 100 部自用轎車，要求他們記錄一年的行駛里程數，結果抽出的 100 部自用轎車一年平均行駛 10,450 公里，且有 2,500 公里的標準差。

(1) 試取顯著水準 $\alpha$=0.05，以信賴區間法檢定 $\mu$ 是否超過 10,000 公里?(10 分)(提示:本題之虛無假設、對立假設分別為 $H_0$: $\mu \le 10{,}000$，$H_1$: $\mu >$

10,000)

(2) 若實際上 $\mu$=11,000 公里，試問此時檢定力(power)為多少?(10 分)

七、試根據下列資料

| x | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| y | 1 | 1 | 2 | 2 | 4 |

(1) 試以最小平方法求 y 對 x 的迴歸方程式，即 $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$ .(不必推導公式，但要有計算過程，否則不給分)(5 分)

(2) 試取顯著水準 $\alpha$=0.05，以 F 檢定法檢定 $\beta_1$ 是否為 0?(8 分)

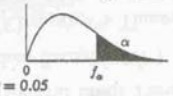
(3) 試取顯著水準 $\alpha$=0.05，檢定母體相關係數 $\rho$ 是否為 0?(7 分)

# 標準常態分配機率值


| z | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|---|---|---|---|---|---|---|---|---|---|---|
| −3.5 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 |
| −3.4 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0002 |
| −3.3 | .0005 | .0005 | .0005 | .0004 | .0004 | .0004 | .0004 | .0004 | .0004 | .0003 |
| −3.2 | .0007 | .0007 | .0006 | .0006 | .0006 | .0006 | .0006 | .0005 | .0005 | .0005 |
| −3.1 | .0010 | .0009 | .0009 | .0009 | .0008 | .0008 | .0008 | .0008 | .0007 | .0007 |
| −3.0 | .0013 | .0013 | .0013 | .0012 | .0012 | .0011 | .0011 | .0011 | .0010 | .0010 |
| −2.9 | .0019 | .0018 | .0018 | .0017 | .0016 | .0016 | .0015 | .0015 | .0014 | .0014 |
| −2.8 | .0026 | .0025 | .0024 | .0023 | .0023 | .0022 | .0021 | .0021 | .0020 | .0019 |
| −2.7 | .0035 | .0034 | .0033 | .0032 | .0031 | .0030 | .0029 | .0028 | .0027 | .0026 |
| −2.6 | .0047 | .0045 | .0044 | .0043 | .0041 | .0040 | .0039 | .0038 | .0037 | .0036 |
| −2.5 | .0062 | .0060 | .0059 | .0057 | .0055 | .0054 | .0052 | .0051 | .0049 | .0048 |
| −2.4 | .0082 | .0080 | .0078 | .0075 | .0073 | .0071 | .0069 | .0068 | .0066 | .0064 |
| −2.3 | .0107 | .0104 | .0102 | .0099 | .0096 | .0094 | .0091 | .0089 | .0087 | .0084 |
| −2.2 | .0139 | .0136 | .0132 | .0129 | .0125 | .0122 | .0119 | .0116 | .0113 | .0110 |
| −2.1 | .0179 | .0174 | .0170 | .0166 | .0162 | .0158 | .0154 | .0150 | .0146 | .0143 |
| −2.0 | .0228 | .0222 | .0217 | .0212 | .0207 | .0202 | .0197 | .0192 | .0188 | .0183 |
| −1.9 | .0287 | .0281 | .0274 | .0268 | .0262 | .0256 | .0250 | .0244 | .0239 | .0233 |
| −1.8 | .0359 | .0351 | .0344 | .0336 | .0329 | .0322 | .0314 | .0307 | .0301 | .0294 |
| −1.7 | .0446 | .0436 | .0427 | .0418 | .0409 | .0401 | .0392 | .0384 | .0375 | .0367 |
| −1.6 | .0548 | .0537 | .0526 | .0516 | .0505 | .0495 | .0485 | .0475 | .0465 | .0455 |
| −1.5 | .0668 | .0655 | .0643 | .0630 | .0618 | .0606 | .0594 | .0582 | .0571 | .0559 |
| −1.4 | .0808 | .0793 | .0778 | .0764 | .0749 | .0735 | .0721 | .0708 | .0694 | .0681 |
| −1.3 | .0968 | .0951 | .0934 | .0918 | .0901 | .0885 | .0869 | .0853 | .0838 | .0823 |
| −1.2 | .1151 | .1131 | .1112 | .1093 | .1075 | .1056 | .1038 | .1020 | .1003 | .0985 |
| −1.1 | .1357 | .1335 | .1314 | .1292 | .1271 | .1251 | .1230 | .1210 | .1190 | .1170 |
| −1.0 | .1587 | .1562 | .1539 | .1515 | .1492 | .1469 | .1446 | .1423 | .1401 | .1379 |
| −.9 | .1841 | .1814 | .1788 | .1762 | .1736 | .1711 | .1685 | .1660 | .1635 | .1611 |
| −.8 | .2119 | .2090 | .2061 | .2033 | .2005 | .1977 | .1949 | .1922 | .1894 | .1867 |
| −.7 | .2420 | .2389 | .2358 | .2327 | .2297 | .2266 | .2236 | .2206 | .2177 | .2148 |
| −.6 | .2743 | .2709 | .2676 | .2643 | .2611 | .2578 | .2546 | .2514 | .2483 | .2451 |
| −.5 | .3085 | .3050 | .3015 | .2981 | .2946 | .2912 | .2877 | .2843 | .2810 | .2776 |
| −.4 | .3446 | .3409 | .3372 | .3336 | .3300 | .3264 | .3228 | .3192 | .3156 | .3121 |
| −.3 | .3821 | .3783 | .3745 | .3707 | .3669 | .3632 | .3594 | .3557 | .3520 | .3483 |
| −.2 | .4207 | .4168 | .4129 | .4090 | .4052 | .4013 | .3974 | .3936 | .3897 | .3859 |
| −.1 | .4602 | .4562 | .4522 | .4483 | .4443 | .4404 | .4364 | .4325 | .4286 | .4247 |
| −.0 | .5000 | .4960 | .4920 | .4880 | .4840 | .4801 | .4761 | .4721 | .4681 | .4641 |

## F 分配臨界值

$P(F > f_\alpha(v_1, v_2)) = \alpha$




$\alpha = 0.05$

| $v_2$ \ $v_1$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 161.45 | 199.50 | 215.71 | 224.58 | 230.16 | 233.99 | 236.77 | 238.88 | 240.54 |
| 2 | 18.51 | 19.00 | 19.16 | 19.25 | 19.30 | 19.33 | 19.35 | 19.37 | 19.38 |
| 3 | 10.13 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 |
| 4 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.00 |
| 5 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 |
| 6 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 |
| 7 | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 |
| 8 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.50 | 3.44 | 3.39 |
| 9 | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 |

## T 分配臨界值


| v \ α | .25 | .1 | .05 | .025 | .01 |
|---|---|---|---|---|---|
| 1 | 1.000 | 3.078 | 6.314 | 12.706 | 31.821 |
| 2 | .816 | 1.886 | 2.920 | 4.303 | 6.965 |
| 3 | .765 | 1.638 | 2.353 | 3.182 | 4.541 |
| 4 | .741 | 1.533 | 2.132 | 2.776 | 3.747 |
| 5 | .727 | 1.476 | 2.015 | 2.571 | 3.365 |
| 6 | .718 | 1.440 | 1.943 | 2.447 | 3.143 |
| 7 | .711 | 1.415 | 1.895 | 2.365 | 2.998 |
| 8 | .706 | 1.397 | 1.860 | 2.306 | 2.896 |
| 9 | .703 | 1.383 | 1.833 | 2.262 | 2.821 |

試題完